

ABSTRACT OF THE DISCLOSURE

A method for depositing metal layers with good surface morphology using sequential flow deposition includes alternately exposing a substrate in a process chamber to a metal-carbonyl precursor gas and a reducing gas. During exposure with the metal-carbonyl precursor gas, a thin metal layer is deposited on the substrate, and subsequent exposure of the metal layer to the reducing gas aids in the removal of reaction by-products from the metal layer. The metal-carbonyl precursor gas and a reducing gas exposure steps can be repeated until a metal layer with a desired thickness is achieved. The metal-carbonyl precursor can, for example, be selected from W(CO)_6 , Ni(CO)_4 , Mo(CO)_6 , $\text{Co}_2(\text{CO})_8$, $\text{Rh}_4(\text{CO})_{12}$, $\text{Re}_2(\text{CO})_{10}$, Cr(CO)_6 , and $\text{Ru}_3(\text{CO})_{12}$.